

Society of Wood Science and Technology (SWST) Position On *Use of Woody Biomass¹ for Bioenergy*

A Position Paper Submitted by the Policy and Critical Issues Committee – September 2008

The Issue

Moving towards a non-fossil energy resource is likely to be one of the most important issues of the 21st century. About 85% of the global energy needs are currently produced from dwindling fossil fuel resources and the production and consumption of these fuels emits about 6.3 billion metric tons of carbon (carbon dioxide equivalent) into the atmosphere per year, adding significantly to greenhouse gas emissions. The issue is particularly important in the United States, a major energy consumer that uses about 25% of all the energy generated in the world. The worldwide demand for energy continues to grow at a rate of about two percent per year. The rapidly expanding and developing economies of India and China and to a lesser extent many other developing countries guarantee that the global energy consumption will continue to grow at a greater rate than the US (2.6% vs. 0.8%).¹ These facts lead to the conclusion that the search for alternative energy resources will continue far into the future.

Woody biomass has some distinct advantages as an alternative energy feedstock. Not only is wood a renewable resource, but also replacing fossil-based energy resources with biomass-based energy resources will reduce the CO₂ component of greenhouse gas. Therefore, increasing the proportion of global energy produced from biomass can aid in bringing the global carbon flux into equilibrium and help ensure that energy needs are met in the global economy.

Wood scientists, with their specific knowledge of wood properties and conversion technology are uniquely positioned to be leaders in the emerging bioenergy technology and policy efforts. SWST needs a policy that encourages research into woody biomass utilization.

Background

Wood has always been an important energy feedstock. Not only does a ton (907 kg) of bone dry woody biomass produce about 13 million Btu (13,800 MJ) of usable energy in a commercial boiler, but also wood has the advantage of being renewable and carbon neutral. Woody biomass is expected to become an even more competitive feedstock for energy products as global concerns related to green house gas emissions and fossil fuel availability increase. At present, about 3% of the US energy and 12% of global energy is produced from woody biomass. Recent estimates suggest that the US energy production from current levels of available woody biomass could be increased to about 6% of the demand using existing technology and perhaps as high as 10% with significant improvements in the biomass handling infrastructure, and conversion technology and efficiency².

Useful energy is extracted from biomass through many processes that may have application in different locations with different needs. The combustion process produces useful energy for heat or to power steam-driven generators that produce electricity. Alternative processes involve an intermediate step to produce a liquid or gaseous fuel that will later be used in a combustion process to deliver the energy to an end use. These alternative processes include both biochemical and thermochemical methods of breaking down wood into constituents that can produce a variety of liquid fuels such as ethanol, butanol, diesel, and bio-oil and gaseous fuels such as producer gas, synthesis gas, methane, and hydrogen. Many of these products themselves can be the feedstock for higher value bio-products with additional processing. One example is the Fisher-Tropsch process, a well known industry method of catalytic conversion of a synthesis gas into liquid hydrocarbon transportation fuels such as synthetic diesel or ethanol.

Nordic countries are ahead of the US in collecting and using biomass for energy; however, the substantial underutilization in some regions of the US provides a major new opportunity for development. While the increased use of woody biomass as a feedstock for bioenergy may place greater demands on timberland and other wood markets, it will also open up new opportunities. The search for finding the best uses for all wood products and their

¹ International Energy Outlook 2007. US Dept. of Energy. Energy Information Administration. Report DOE/EIA-0484.

² Biomass as Feedstock for a Bioenergy and Bioproducts Industry: The Technical Feasibility of a Billion-Ton Supply. US April 2005. Dept. of Energy. Oak Ridge National Laboratory.

resources will become increasingly important and will create new opportunities for studying wood properties, genetic improvement, species selection, tree/biomass plantations, collection methods and processing technologies.

Challenges

Whether the increase in the use of wood for bioenergy, biofuels, and biobased products is rapid or sluggish depends on some artificial and institutional deterrents as well as economics and environmental concerns. Some important challenges to growth in use of wood for bioenergy, biofuels and biobased products are:

- Cost of procuring and processing woody biomass feedstock can be high
 - Harvesting, transporting, processing, and marketing woody biomass requires new infrastructure
 - Available supply is often distant from the customer
 - Concerns about supply sustainability discourage investment
- Nutrients are depleted from the soil by the removal of woody biomass
- Lack of understanding exists concerning the environmental benefits of wood, especially mitigation of carbon emissions
- Marketing of bioenergy, biofuels and biobased products is insufficient to generate new demand
- Energy industry is reluctant to invest in facilities based on nontraditional fuel sources
- Competition exists for woody biomass resources from existing woody biomass users who are not using woody biomass for bioenergy

Each of these challenges is also an opportunity for fostering research that will advance science-based decisions needed to move toward a non fossil fuel-based energy society.

Specific Actions to Encourage Bioenergy Development

Growing public interest in developing non-fossil fuel based energy policies is providing new opportunities to support research and development of a viable, sustainable, and competitive bioenergy industry. For example the US Energy Policy Act of 2005, provides authorization for grants to owners or operators of facilities that use biomass as a raw material to produce electricity, sensible heat or transportation fuels, and for research opportunities to improve the use of, or add value to, biomass. Research focused on selecting the best feedstock, improving energy conversion efficiency, finding new conversion pathways and reducing the processing costs will continue to increase the production efficiencies of biomass-based energy products. The science and technology needed to advance the utilization of woody biomass for bioenergy when combined with public commitment will result in an increase the energy independence of nations and will have positive global environmental benefits.

Our society now needs to take an advocacy position on the effective use of woody biomass if energy independence and greenhouse gas reduction objectives are to be achieved. SWST should take a leadership role in encouraging the development of novel energy generation processes from woody biomass. Specific recommendations include:

- Support an increase in government and private funding of woody biomass research
- Encourage collaborative research and education projects that focuses on woody biomass based products
- Encourage identification of sustainable biomass supplies from public and private forests
- Encourage innovative research on the use of woody biomass as a feedstock for value-added products
- Educate the public, private enterprise, and the policy makers on the value of managing a sustainable woody biomass resource for products beneficial to society's needs

POSITION STATEMENT

Woody biomass will play a substantial role in a global energy future. SWST supports the increased utilization of biomass for sustainable energy production. Members of SWST have unique expertise in the utilization and processing of woody biomass. SWST and its members can help to support the development of woody biomass-based energy systems and to develop advocacy positions to this end by building a science-based argument in support of woody biomass for bioenergy. Wood scientists will advocate for wood-derived bioenergy, transfer knowledge to industry and the public, and educate students about the use of woody biomass for energy.